

Bachelor of Arts or Bachelor of Science **Physics**

INFORMATION

Physics is the fundamental natural science that explores the basic properties of matter and energy. Physics is relevant to all other sciences: biology, chemistry, geology and all branches of engineering. The different areas of physics covered in Cleveland State's undergraduate program include: atomic and molecular physics, solid state physics, nuclear physics, biophysics, material science, optics, waves, electronics, astronomy and medical physics. The field of physics has been instrumental in the development of advanced materials, electronic and optical devices and medical equipment. Devices and innovations resulting from physics research include the laser, the microwave oven, LCD and plasma TVs, integrated circuits, computer hardware advances, communication advances, new ways of energy production and other advances.

CAREER OPPORTUNITIES

Bachelor graduates work as research assistants and technicians. They work in the following industries: electronics, semiconductor, communications, aerospace, instrumentation, software development, engineering and others. Job titles include: radiation health officer or nuclear technician, optical engineer, applications engineer, component evaluations or electronics specialist and others. In addition, there are many other fields that require a strong science background, such as patent law

and technical sales and service. There is also a high demand for bachelor graduates as physics/science high school teachers (licensure needed).

Over 60 percent of bachelor physicists go on to pursue graduate studies in physics or related fields. Master graduates have careers in applied research and development in industry and government, and teaching positions at community colleges. Specialized master's programs in physics prepare students for a specific career path, such as Cleveland State University's Medical Physics master's program, which trains scientists to work in medical centers in radiation therapy. Doctoral graduates assume university faculty positions teaching and directing research, direct research in government labs, or work in high-level positions in industry, directing research.

PROGRAMS

BACHELOR OF SCIENCE (B.S.) IN PHYSICS: Prepares the graduate for technical careers in industry, research centers and/or graduate studies.

BACHELOR OF ARTS (B.A.) IN PHYSICS: Prepares the graduate for careers in applied physics, computer science, education, medicine, law, technical sales, scientific journalism or other fields requiring analytical skills and a broad understanding of physics. The B.A. curriculum replaces the advanced physics courses required in the B.S. degree with designated science electives. Students in

Engineering or Computer and Information Science can earn a B.A. in Physics as an additional degree with a modest increase in course requirements.

Secondary Teacher Licensure Track: Available in either the B.S. or B.A. program, but is more common with the B.A. program. Students interested in teaching high school physics/science should contact the physics advisor for science course requirements and the Education Student Service Center for the education course requirements.

An Honors Program is available for students in the B.S. in Physics program, as well as a Scholars Program. The program is for qualified students interested in research careers and pursuing graduate studies in physics. Engaged learning experiences (for all programs) include inquiry-based physics laboratory courses, research experience with nationally recognized Cleveland State University faculty, and co-op and internship opportunities. A physics minor requires 18 credit hours of specified physics courses. Evening B.A. and B.S. physics degrees are also available. All students receive individual advising.

**For more information, contact:
College of Science**

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Cleveland State University
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Phone: (216) 687-2425
Website:
<http://www.csuohio.edu/sciences/dept/physics/index.html>

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Physics

Requirements of the College of Science: A minimum of 128 credit hours is required for a Bachelor of Science (B.S.) degree or a Bachelor of Arts (B.A.) degree, of which 42 semester credit hours must be earned in 300- and/or 400-level courses. Introduction to University Life (one credit hour) is required for all newly admitted freshmen (not required for transfer students).

General Education Requirements: All degree-seeking students are required to meet general education requirements. Students are responsible for ensuring that courses chosen satisfy these requirements and are encouraged to consult with their academic advisor. A comprehensive description of the requirements is available online at <http://www.csuohio.edu/academic/gened>.

Required Courses for the B.S. in Physics (credit hours in parentheses):

Required Physics Courses: (42 credit hrs)

PHY 243 University Physics I (5) (or 241 or 243H)

PHY 244 University Physics II (5) (or 242 or 244H)

PHY 330 Introduction to Modern Physics (4)

PHY 340 Mechanics and Vibrations (4)

PHY 350 Electricity and Magnetism (4)

PHY 440 Quantum Physics I (4)

PHY 450 Optics and Electromagnetic Waves (4)

PHY 455 Optics Laboratory (4)

PHY 474 Thermal Physics (4)

PHY 475 Statistical Physics (4)

Required MTH/CIS Courses: (16 credit hrs)

MTH 181 Calculus I (4)

MTH 182 Calculus II (4)

MTH 281 Multivariable Calculus (4)

CIS 260 Introduction to Programming (4)

Technical Electives: (10 credit hrs)

300- and/or 400-level course in physics, chemistry, mathematics, or engineering as approved by the advisor

Courses Required for the B.A. in Physics (credit hours in parentheses):

Required Physics Courses (18 credit hrs)

PHY 243 University Physics I (5) (or 241 or 243H)

PHY 244 University Physics II (5) (or 242 or 244H)

PHY 330 Introduction to Modern Physics (4)

PHY 474 Thermal Physics (4)

Required MTH/CIS Courses: (16 credit hrs)

MTH 181 Calculus I (4)

MTH 182 Calculus II (4)

MTH 281 Multivariable Calculus (4) *OR* MTH 220, MTH 284

CIS 260 Introduction to Programming (4)

Required Sequence (Choose ONE): (8 or 10 credit hrs)

CHM 261/266 General Chemistry and Lab (5) *AND*

CHM 262/267 General Chemistry II and Lab (5)

OR

BIO 200/201 Introductory Biology I and Lab (4) *AND*

BIO 202/203 Introductory Biology II and Lab (4)

OR

CIS 265 Data Structures and Algorithms (4) *AND*

any other 4 credit hour 300-level CIS course

Physics Electives: (16 credit hrs)

ANY 300- and/or 400-level physics course

AND/OR

PHY 201 Astronomy: Stars and Galaxies (3)

AND/OR

PHY 202 Astronomy: Planets, Asteroids and Comets (3)

Other: (16 credit hrs)

16 upper-division credits in a coherent program from disciplines such as biology, chemistry, computer science, mathematics, environmental science, education or engineering, as approved by the adviser.

Requirements for the B.S. Honors in Physics (credit hours in parentheses):

Required Physics Courses: (42 credit hrs)

Same as for B.S. Physics degree

Required MTH/CIS Courses: (16 credit hrs)

Same as for B.S. Physics degree

Other Required Physics Courses: (10 credit hrs)

PHY395 Physics Seminar (4)

PHY441 Quantum Physics II (4)

PHY493 Advanced Topics in Physics (2)

GPA Requirements: A cumulative GPA of at least 3.2 in physics and mathematics courses is required at graduation. A student who does not meet the GPA requirements at graduation, but meets all the requirements for the B.S. degree in physics, will receive a normal B.S. in physics degree.

June 2009